Residential Fall Protection

Nailing it Down

Chicago and Northeast Illinois District Council of Carpenters Apprentice & Training Program

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Residential Fall Protection - Nailing It Down

Companion Workbook for Video

This workbook will provide a basic look at residential Fall Protection. It is a companion to the video entitled "***Residential Fall Protection, Nailing It Down***." Reading this workbook, and keeping it available for reference, will help you understand the requirements you should follow when working around some of the hazards on a residential job. Check the Table of Contents to find the exact information you are interested in reviewing.

This workbook does not change any of the rules in the OSHA standards themselves or the Occupational Safety and Health Act of 1970. Because of slight changes in the way OSHA looks at working conditions over time, this workbook may not be completely up-to-date. Refer to OSHA's construction standard, 29 CFR 1926 and OSHA's STD 3-0.1A, Interim Fall Protection Guidelines for Residential Construction for the latest changes.

Special thanks to Jo DeFranco, Administrative Assistant at the Residential Construction Employers Council; Peter Dinchel, Instructor for the Carpenters Union; Rita Mosley, CHCM, CSP, with the Illinois Onsite Safety and Health Consultation Program, DCEO; and Nancy Quick, CIH, CSP, with the North Aurora Area OSHA office for their important contributions in time and knowledge in the preparation of this material.

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Introduction

Suspension must be adjusted correctly to fit and to keep the shell at a minimum distance of one and one-fourth inches from your head.

A safer jobsite means using the correct personal protective equipment (PPE) on the job. All operations around construction sites require the use of some type of PPE. Make sure you have the right equipment available. Typically, this equipment is required to be used and worn on all jobs: hardhat, safety glasses, appropriate shoes, sunscreen. Make sure you wear them.

Construction sites are dangerous. You are exposed to slips, trips, falls, sharp objects, and flying or falling debris. You can avoid many of the hazards by taking the time to dress for the job. Taking the time to do the job right often means getting out extra safety equipment and going over safety procedures.

Head Protection

Hard Hat Designations

- **Class A/G***

Used for building construction. Provides impact protection, but limited voltage protection.

- Class B/E*

Used for electrical work. Protects against falling objects and hi-voltage shock and burns.

- **Class C**

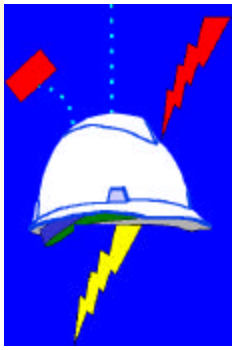
Designed for comfort. Protects against bumps with little or no protection for construction work.

***New ANSI designations are shown after the slash.**

Hard hats are an essential part of your equipment. Head protection is required because there is risk of injury from moving, falling or flying objects. Hard hats are designed to protect from impact and penetration caused by objects hitting your head.

- The shell of the hat is designed to absorb some of the impact of falling objects.

- The suspension, which consists of the headband and strapping, is even more critical for absorbing impact. The hard hat must be adjusted and worn correctly to provide you the protection needed.



You may not wear the hard hat backwards!

Be sure to wear the right hard hat for the job. Hard hats come in three classes and are marked with the name of the manufacturer, the date of manufacture, the ANSI designation, as well as the type and class of hardhat.

What value do you put on your eyesight?

Eye Protection

Always wear the correct eye and face protection. Street-wear glasses are not suitable for use as the lenses are thinner and lighter in weight than comparable safety glasses. Although street-wear glasses and frames must conform to certain Food & Drug Administration safety standards, they cannot afford the protection needed at the jobsite. They do not meet OSHA requirements. You can always tell if the glasses you use are suitable for use. Each safety glass lens is distinctly marked in a permanent and legible manner with the manufacturer's monogram. All major components, such as the frames, are also marked "Z87". Only a correctly marked frame and lens can be used as a pair of construction safety glasses.

Other Protection

1. Foot injuries happen when heavy or sharp objects fall on your feet; when something rolls over your foot; when you step on an object that goes through the bottom of your shoe; or if you are careless with dangerous hand-held equipment. Heavy-duty work boots should have slip-resistant soles to provide a good grip on slippery surfaces. Wear the best possible boots or shoes while working on the roof. When sheeting or shingling a roof, this may include gym shoes, unless there are nails or other protruding objects around the site, that could puncture the sole of the shoe.

   Never let your shoe or boot bottoms get too worn out as they will not provide slip-resistance on sawdust, snow, ice, or mud. Repair the bottoms of still useable shoes or boots. Replace totally worn out shoes or boots. Your contractor can tell you that worn shoes or boots cannot be used on the jobsite. This could be the reason you get sent home by your contractor to avoid an accident. Your contractor always gets to decide what shoes and boots you wear on his job.

2. Your skin needs protection from the sun and cold weather on the jobsite. Skin cancer from over-exposure to the sun can show up years from now if you are not careful at work and at home. It might be necessary that you use sun screen or sun block if you are fair skinned or on various medications. You may find you need a light-weight long-sleeved shirt and full length pants (no shorts) even in the hottest of days.

During cold weather keep skin covered at all times. Wear extra long T-shirts or suspenders to keep your back covered when working. Prevent frostbite by dressing for the weather conditions. Once you receive frostbite, your skin will be sensitive and the next frostbite will happen much faster and be much worse. Sometimes, fingers and toes need to be amputated due to frostbite.

Hands require protection from slivers, chemicals, and cuts. Make it a habit to carefully look at all the material you go to pick up to avoid slivers. Remove slivers carefully and then clean and cover all sliver wounds to prevent infection.

Gloves are the easiest way to protect your hands from chemicals or cuts. You'll need help from your contractor to pick the correct type of glove for a chemical on your job. The information is contained in a Material Safety Data Sheet (MSDS) that your contractor is required to have on hand. Handling glass, metal laminates, or other very sharp materials call for a pair of carbon-fiber gloves. These gloves resist cutting by a utility knife, or sharp jobsite materials, to protect your hands.

You can drastically reduce your chances of having an on-the-job injury to your eyes, head, skin, hands or feet by always thinking ahead and wearing the equipment that is needed to get the job done safely. Your contractor will teach you what personal protective equipment you need. It is your responsibility to wear it. No one can use it for you. For your sake, and for those who love and need you, learn how to use it and wear it.

Construction and Fall Protection

Falls are the leading cause of worker deaths in construction. There are many fall hazards on a residential construction site, including:

- Open holes and uncovered floor openings.
- Poor walking and working surfaces.
- Broken or worn-out fall protection equipment.
- Poor or no training.
- Unstable or slippery work surfaces.

Falls are a leading cause of death

On construction jobs each year, **a third of all workers** that are killed and injured are a result of falls. If you want the numbers, that's over 420 killed and 100,000 injured. Despite the high death and injury rate, construction can be a safe occupation when you watch for fall hazards, and follow your contractor's safety and health program.

Each year, guardrails, covers, personal fall arrest systems (PFAS), and positioning devices prevent many of these deaths and injuries. All of these safeguards aim to protect you from fall hazards when working on residential construction sites.

The idea of Fall Protection is to have something already there to **prevent the fall**, to **limit the fall**, or **warn of an impending fall** that could injure or kill you. You must be trained in advance to recognize fall hazards, and what to do to protect yourself and other workers from injury. Your contractor can put all the pieces of a safety and health program on the jobsite, but only **you**, the worker, can make sure it is being used when it's necessary. Your contractor pays for all required fall protection equipment so you can do the job safer.

Fall protection is required on both commercial and residential jobsites, but the regulations are different for each. Commercial construction requires fall protection for any work over 6 feet in height.

Residential Construction

Residential construction is building a regular single-family home or townhouse or building condominiums or apartment buildings framed as a single-family home. Construction includes framing of wood or metal studs, wood or metal joists, and wood or metal rafters are being framed as in common wood frame construction.

Types of Fall Protection In Construction

Fall protection protects you from a variety of fall hazards. The distance that you may fall is the main factor that determines if fall protection must be used. Some form of **fall protection is required if there is a possibility of any fall of 6 feet or more**, or even less if you are working around a dangerous machine or container of hazardous fluids. When your feet get above 6 foot from another height, fall protection is needed.

There are at least nine different types of fall protection systems for both residential and commercial construction situations. Your contractor should be selecting the best possible fall protection from the nine types after looking at all the specific conditions on every jobsite you're working at.

The main five types of fall protection, or what we call **conventional**, are real devices or equipment that will stop you from falling to the ground. They include: guardrail systems; safety-net systems; personal fall-arrest systems (PFAS); positioning device systems; and covers.

Other types of fall protection, called **non-conventional** or alternative, are not equipment to stop a fall, but **ways** used to warn you when you are getting close to a possible fall hazard. Non-conventional types of fall protection include: warning line systems; controlled access zones (CAZ); safety monitoring systems; and fall protection plans (FPP).

Types of Fall Protection On Residential Jobsites

The type of fall protection you use depends on the **work you are doing** at the jobsite. Other than framing the house, full fall protection is required for anyone at a 6 foot fall hazard, just the same as for commercial construction.

There are **very specific steps** to follow when you are working **above 6 feet** on a residential building.

The types of fall protection are divided among three main groups:

- Hazard Controls
- Management Practices
- Personal Protective Equipment (PPE).

Guardrails
Slide Guards
Covers

Hazard Controls

Controlling the hazard will minimize your chances of falling through unprotected openings. The process of hazard control requires that physical barriers be put in place so that you are not exposed to a hazard. This is the preferred method as it protects everyone at the site - workers, inspectors, security guards, emergency personnel, and visitors.

Controlled Access Zones
Safety Monitors
Interim Fall Protection Guidelines
Fall Protection Plans
Training

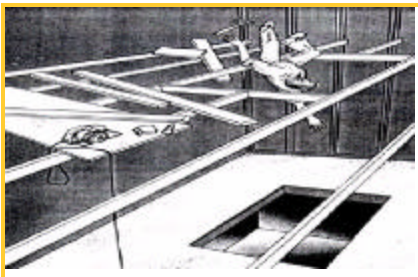
Management Controls

Management controls address the exposure to a hazard. Changing a policy or procedure so that the employee is not exposed will help to reduce the probability factor. These controls, however, are not effective if you choose not to follow them, or supervision doesn't train and enforce them. Poor choices regarding training, enforcement, and a willingness to follow procedures will nullify this approach because the exposure will still be there.

Personal Fall Arrest
Positioning Devices

Personal Protective Equipment (PPE)

PPE involves the use of equipment in an attempt at protecting you from the exposure to the hazard. If PPE is to work, there must be training in the use and maintenance of the equipment. A program of enforcement must also be in place to insure the use of the chosen equipment. This approach provides the most opportunity for poor choices to be made at many levels. Any breakdown at any level will nullify the effectiveness of this approach.



OSHA'S Fatal Facts
Carpenter was setting trusses on the second floor of a house they were building. There was no guardrail or floor cover over the floor opening for the stairway. While placing a truss in position, one of the carpenters fell through the opening to the concrete basement below.

Hazard Controls for Fall Protection

Guardrail Systems

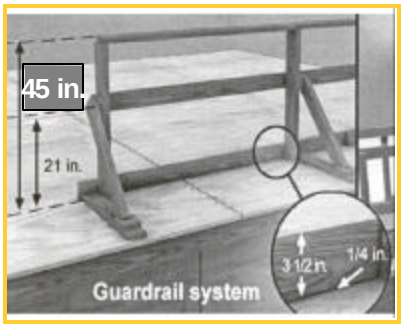
Physical barriers are critical to your safety on construction sites. A guardrail system is a physical barrier put in place to prevent falls to lower levels. It is the most common system used and it protects everyone simply and equally - workers, inspectors, security guards, emergency personnel, or visitors.

Guardrail systems are made up of railings consisting of a top rail and mid-rail. The top of the guardrail must be between 39-45 inches above the work surface. Mid-rails must be installed midway between the top edge of the guardrail system and the working level. Typically on residential construction sites, wood 2' x 4's are used with vertical supports not more than 8-feet apart. Some special points about guardrails:

- Guardrail systems must resist at least **200 pounds** of force applied on the top edge, in any direction and at any point along the rail, without causing the top edge of the rail to deflect down to less than 39 inches above the floor.
- All parts that make up the mid-rails, must resist at least 150 pounds of force applied in any direction at any point along the mid-rail parts.
- Guardrail and mid-rail parts cannot have rough or jagged surfaces that would cause injuries, or snag clothing.
- Top rails and mid-rails must not cause a projection hazard by overhanging the ending post.
- The materials used to build a guardrail system are wood, pipe, chain, wire rope, and structural steel. **Steel or plastic banding** cannot be used for top or mid-rails.
- When guardrails are around holes used for moving materials, a removable guardrail section can be built (also resisting 200 pounds of force), but the removable section must always be in place except when the material is being moved. When removed, there must be some other form of fall protection, usually a personal fall-arrest system (PFAS).

- Guardrails around ladder ways must be arranged with a gate, chain, (both resisting 200 pounds) or offset so that a person cannot walk directly into the hole. If the ladder is job-made, the ladder uprights should extend 3 feet above the floor and leave the rungs out of that 3-foot for direct step-through access.

Guardrails are also used to protect you from falling objects. A toeboard, while too low to be called a guardrail, is part of a full guardrail system and used to stop objects from falling. Toeboards must be at least 3-1/2 inches in vertical height and have no more than a ¼ inch clearance above the working surface. Screening, mesh or solid panels can also be used instead of a toeboard. If screening or mesh is used, it must be placed between the top or mid-rail and the base of the working surface. There can be no holes or gaps for objects to fall onto someone.



Slide Guards for Sheeting and Shingling

When you install roof sheeting and shingles on residential sloped roofs, use slide guards as fall protection. Slide guards for sheeting a roof (sheeting slide guards) are completely different than slide guards for shingling roofs (shingling slide guards). Shingling slide guards cannot be used alone for fall protection on roofs where the bottom of the roof (the eave height) is over 25 feet from the ground, only conventional fall protection, guardrails or a PFAS, may be used above 25 feet.

Sheeting slide guards

When sheeting residential roofs, or a commercial roof which looks like a residential roof, you can use sheeting slide guards for fall protection. The **3½" height of the 2 x 4** must be standing.

The simplest sheeting slide guard is made of two long 2 x 4's nailed into a 3½" x 5" wooden angle. The 5" leg is flat to the roof deck with the 3½" leg at the top of the slide guard. This way the flat 2 x 4 actually supports the standing 2 x 4 if you fell down the roof. This type of slide guard can be reused at the next roof to be sheeted, or taken apart for use in the building.

- Securely nail the flat 2 x 4 into the rafters or trusses, not just the thin sheeting. Run the slide guards at 90 degrees to the rafters or trusses, never sloping up or down a roof.

- Place sheeting slide guards at the bottom of, and along the entire bottom length, of the roof. Additional guards, still 3-1/2 inches tall, are placed based on the slope of the roof.

- On low angle roofs (up to 9:12), after the bottom slide guard; install a guard every 13 feet on up the roof.

- On steep angle roofs (over 9:12), install slide guards every four-foot on up the roof.

- A different sheeting slide guard is a reusable metal bracket that attaches to the rafters or trusses through the sheeting at 4 foot spacing using slots over several 16 penny common nails. A 2 x 4 with the **3½" height up** is nailed to the metal brackets to form the guard.

- The bottom sheeting slide guard can be installed by standing on the ceiling joists or on the truss webs. **Do not install the guard while standing on the sloped sheeting itself.**

Leave the sheeting slide guards installed for other trades to use and for stocking the shingles onto the roof. Remove them just before the shingling is to begin. Removal begins from the top down. Use a ladder to remove the bottom guard. Remove all nails sticking out from the guards immediately. The L-shaped guards can be left nailed together and re-used over and over again.

Shingling slide guards

The shingling slide guard is a multi-part guard. There is a metal bracket that attaches to the rafters or trusses at 4 foot spacing using slots over several 16-penny common nails. These brackets sit on top of some shingles, and then under some others, so they may be simply slipped out of the slots to be removed.

The bottom slide guard must be continuous, and a 2" x 6" with the 5½" height up. The 2 x 6 is nailed to the

Use slide guards for sheeting and shingling activities

metal brackets. No more than three rows of shingles shall be applied before installing the bottom slide guard.

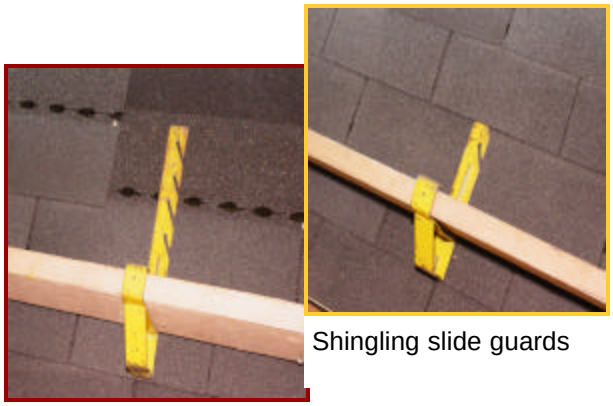
- On a low angle roof (up to 4:12), where the eave height is not over 25 feet, slide guards or a safety monitoring system can be used.
- On a low angle roof (4:12-8:12), where the eave height is not over 25 feet, slide guards **are** required, no exceptions.
- On a steep angle roof (over 8:12), where the eave height is not over 25 feet, **only conventional fall protection is allowed**, usually a PFAS.
- Where the eave height is over 25 feet, no matter what the roof slope, **only conventional fall protection is allowed**.

Shingling slide guards are allowed, based on eave height and roof slope.

On a low angle roof (6:12 or less), a slide guard is required only along the full bottom of the roof, 2 x 6 standing 5½" tall.

On a steep angle roof (over 6:12-8:12), a full bottom slide guard is required standing 5½" tall, and additional full slide guards only 1½" tall every 8 feet on up the roof. The same metal brackets are used for the upper guards, and the 2x4 or 2x6 guard is now laid flat.

Slide guard removal begins from the top down. Use a ladder to remove the bottom guard. The bottom slide guard can be removed **only** when the roofing job is completed.



Shingling slide guards

Covers

A cover is something very solid used to cover openings in floors, roofs, and other walking/working surfaces. Covers provide fall protection as well as protection for others below from falling materials. Some special points about covers:

An opening that is cut, drilled, or framed **2 inches or more in its least dimension**, in any floor, roof, or other walking/working surface is a hole. Over 2 inches in size for a stairwell, a mechanical supply, a plumbing stack, etc. on a construction site, the hole must be completely covered.

A cover can be a sheet of plywood to protect holes or openings in floors and roofs. Floor hole covers must support at least twice the weight of all employees, equipment, and materials that may be placed on the cover at any one time. For example, if 2 workers with their tools each weigh 250 lbs., then the cover must be able to support 500 lbs.

Some openings may require a 2 x 4, or some other material, to make a support frame for the plywood. Just remember at least twice the weight to be protected.

Mark all covers with the word "**HOLE**" or "**COVER**", and secure in place to prevent accidental movement. Do not place material stored inside buildings under construction within 6 feet of any stairwell or inside floor openings unless fully covered.

Floor hole covers must support at least twice the weight of all employees, equipment, and materials that may be placed on the cover at any one time.

Management Controls For Fall Protection

Controlled Access Zones (CAZ)

A controlled access zone, or CAZ, is a clearly marked **restricted work area** used **along with** a written FPP. The area is usually marked out by caution signs and/or caution tape, placed between 6 feet and 25 feet from the fall hazard or leading edge. Signs, if used, are marked with **CAZ signs**, which say something like:

> Caution
>
> Controlled Access Zone
>
> Authorized Workers Only!

The CAZ is used for specific types of **leading edge work** (e.g., building decks, erecting walls, or installing roof trusses) and **only when conventional fall protection is just not possible.** Only trained workers actually performing the specific work are allowed inside the CAZ. All other workers must stay out of the CAZ, or **all work stops**. Each worker inside the CAZ needs to be listed by name on the **written** jobsite Fall Protection Plan.

The control line needs to be rigged to be at approximately guardrail height. The line does not need to be as strong as a guardrail, it is used just to mark an area of work on the ground. The CAZ signs should be between guardrail and eye level, placed often enough to be seen by all outsiders. The control line and CAZ signs are removed when the CAZ is no longer needed at the end of each day.

Safety Monitoring Systems

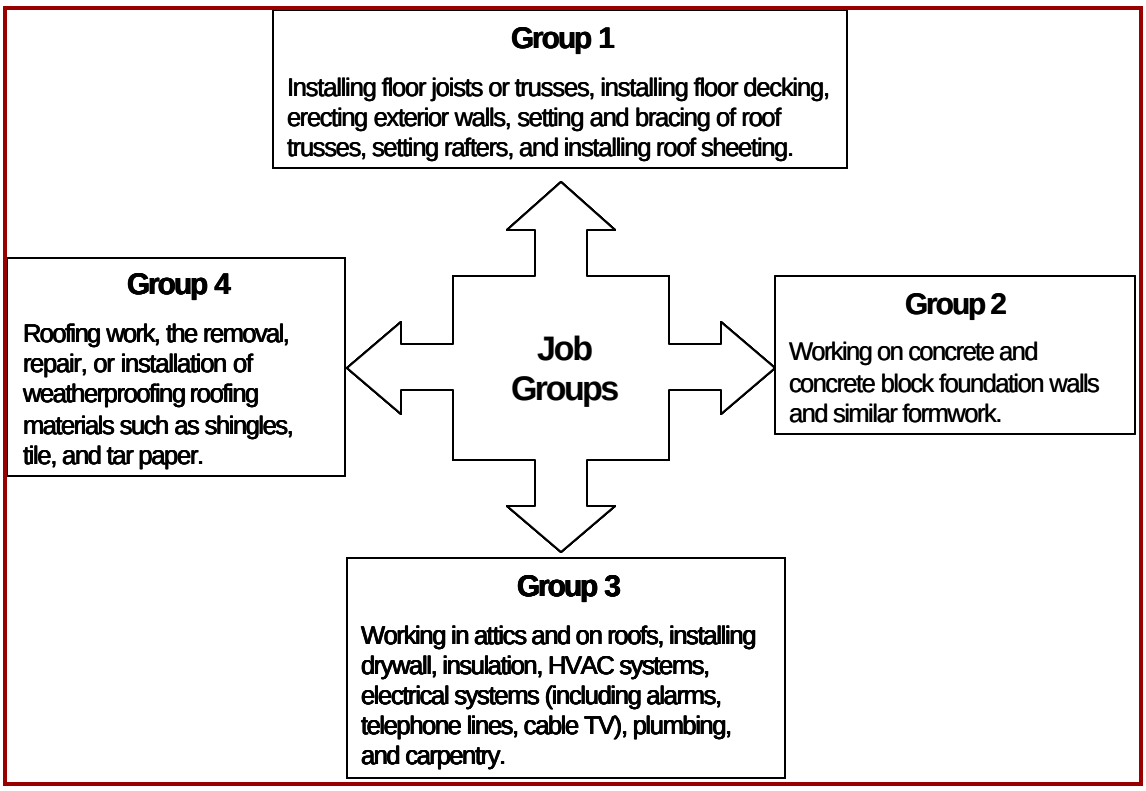
A safety monitoring system is a competent person, who watches and warns workers who may be unaware they are getting close to fall hazards while working. All workers must comply immediately to a warning from a safety monitor.

The monitor must know all the hazards he is protecting the workers from. The monitor must be in sight and on the same level as the workers, close enough to be able to warn them by voice. If a safety monitor needs to leave the area for whatever reason, all work must stop until he returns.

Used along with a CAZ and a fall protection plan, safety monitoring protects from fall hazards where conventional fall protection would be very hard to use.

Interim Fall Protection Guidelines

Determining the type of residential fall protection you need depends on what work you are doing on the job. According to OSHA's STD 3-0.1A, Interim Fall Protection Guidelines for Residential Construction, there are four job groups that have special fall protection rules. Some of the information is listed here; refer to the Guidelines for more detailed information.



A fall protection plan (FPP) is required for all Group 1 work. The FPP guides you in safer work practices when working at fall heights where you can be hurt.

All other jobs on a residential jobsite working over 6 feet require conventional fall protection, such as a guardrail, safety net, or a PFAS (personal fall-arrest system).

Working above 48', even doing the exact jobs listed for Group 1, requires full conventional fall protection for each worker.

Examples: Setting windows on a residential jobsite.

- Two workers, both on the inside of the building, leaning out the rough opening to set the window, when there is over a 6 foot fall hazard. A guardrail would not work, it would block the window installation. A **separate** personal fall-arrest system (PFAS) would be required for **each worker**, the "nailer" and the "leveler". This type of PFAS could be a positioning device (prevent you leaning out the window too far) rather than a fall-arrest device (allowing a 6 foot fall then safely stopping it). The PFAS would need to be moved and reattached at each window location with a fall hazard above the 6 foot height.
- Setting the same window with one worker **outside on a ladder** and another in the building, near the opening holding the window and the level. Again when there is over a 6 foot fall hazard. No fall protection is required for the worker on the ladder, but a PFAS is for the worker inside.
- Setting the same window with two workers both on the outside of the building on a **pump jack**, with over a 10-foot fall hazard (a pump jack is considered a scaffold, with a 10 foot fall protection height). This would require a full guardrail, mid-rail, plus end rails, on the pump jack or a separate PFAS for each worker, probably attached to the roof. The pump jack must follow the OSHA scaffold rules regarding mudsills, platform width, platform distance from the building, and be properly braced as specified by the manufacturer.

Save Time! Save Money! Save Lives!

Installing the window while the wall is flat on the deck, then lifting the wall, avoids needing the PFAS, ladder or the pump jack.

The contractor will designate a competent person, a crew supervisor or foreman and a controlled access zone. You, and all other workers on the job must be trained on this FPP and all safety steps used. Trained in a group, trained individually, trained for 4 minutes before starting work each week or trained when first put on the roof crew a year ago, but everyone must be told by the contractor what needs to be done for fall protection (the FPP). Any fall protection questions or problems, must be answered or handled before the work starts. Everyone on the job must follow all parts of the FPP. During work if a fall protection problem comes up, you must tell the competent person immediately. Only the competent person can decide how to change the FPP.

Other safe practices that need to be followed, include:

- Stage materials so you have quick and safe access to them. Material cannot be stored within 6 feet of the stairwell and other openings left uncovered. Material can be stored next to guardrails if the material cannot fall through any

vertical or horizontal openings. Placing drywall or a piece of plywood temporarily against the guardrail would block anything accidentally falling into the opening.

- Stop work during bad weather such as high winds, rain, snow, or sleet.
- Ensure that materials you will be using are located as close as possible to where you will be on the top of the foundation or formwork.

Properly guard anything sharp or thin that you could fall onto from the foundation or formwork. This is called an impalement hazard, and is usually lengths of reinforcing bar (rebar) sticking upward from previous concrete work. It could also be pieces of conduit or copper water supply sticking up from a slab for example. Workers have been impaled on rebar, some have died and some did not.

Do not just bend these bars over, you would kink them just like a copper wire, and the bar may not be able to be used again. There are special reusable rebar impalement protectors that can be put over each bar. There is a cap of metal built into the protector that will not allow the rebar to punch through the top of the cap. Some protectors that look just the same are protection for scratches only, not impalement. A U-shaped 2 x 4 wood trough can also be built and attached to the rebar sticking up. Falling onto the impalement protectors or the trough will hurt, but you will still be alive.

Do not walk on the exterior walls, or the interior walls near a stairwell. The danger of falling farther than a single interior floor-to-floor height is too great walking these walls. Walking anything, such as headers, with a similar fall is to be avoided.

Floor Joists or Trusses and Decking

In the basement or a crawl space, installation of the 2 x 6 onto a steel beam with a powder actuated tool for example, will be from a ladder unless the steel is one piece from concrete pocket to concrete pocket. Pocket to pocket steel can be walked on to attach the nailer. Before walking on basement steel made up of several pieces of steel, all nuts and bolts must be completely installed, the 2 x 6 nailer completely attached, and one-piece 2 x 4 flat supports from the nailer on the beam to the mudsill installed. As many flat supports as required, from one mudsill or both front and back mudsills, to hold the steel sturdy for safely walking on the beam.

The following way of installing floor joists or trusses can be used whether you install the box first, or after the joists. Joists or trusses can be laid flat where they are to be installed. The installers can stand with one foot on the spread flat joists or trusses and one foot on the mudsill or beam nailer. Roll a joist or truss vertical and fasten in place. Step back one flat joist or truss, and roll the joist or truss you just stepped off and install. The installers can walk on the spread flat joist or trusses with more to support a fall then just walking on the mudsill or beam nailer itself.

Save Time! Save Money! Save Lives!

On top of the decks, lay out the top plates for ceiling joists, trusses, or rafters while the wall is flat on the deck. If this is not possible, layout the top plates from a ladder.

Install the first row of decking from the ground level, ladders, or higher-than-normal sawhorses with planks. Tack these sheets securely to the deck. After the first row has been installed, workers must work from this first row to install the remainder of the deck.

For stairwell and other openings, mark decking and leave it in place, or cut out, support as required, and nail back into the openings. Mark all covers with the word "**HOLE**" or "**COVER**", and secure in place to prevent accidental movement.

Install guardrails for stairwell and other openings that are cut out and not replaced.

Building and Standing Exterior Walls

- Complete as much cutting and assembling of any units; such as headers, windows, doors, or exterior soffits, away from the edge of the deck.
- Layout the top plates for ceiling joists, trusses, or rafters while the wall is flat on the deck. If this is not possible, layout the top plates from a ladder.

Cover or protect all wall openings, floor holes, and roof holes (with more than a 6 foot fall hazard). Walls should be stood up carefully from the deck with 2 x 4 verticals at the deck edge to prevent the bottom from moving too far off the wall edge.

Roof Trusses and Rafters

Use higher-than-normal sawhorses (48" or taller) with planks, or ladders to install the trusses and rafters onto the top plate. Work from a stable platform with safe access to install the rafters to the ridge. The ridge should be supported at the correct height by support studs as necessary, and braced to prevent collapse during rafter installation. Each gable end must have a secure temporary diagonal

brace after the second truss is installed, and rows of 1 x 4 stay-lathe as necessary to keep all the trusses on-center and safely standing.

- Set gable end trusses standing with the crane when possible. Gable end trusses must be erected carefully when lifted from the top plates with 2 x 4 verticals at the gable end to prevent the bottom from moving too far off the wall end.

Save Time! Save Money! Save Lives!

Lay out the top plates for ceiling joists, trusses, or rafters while the wall is flat on the deck. If this is not possible, layout the top plates from a ladder.

- For fall protection, workers must either hold onto or stand on the ceiling joists, or stand in the webs of joists which are upright and safely secured. Workers might also stand on secured and braced trusses or rafters. Trusses should be spread lying down, or pushed to the installers by someone standing on the deck below with a 2 x 4. The installers can walk on the spread flat trusses on the top plate with more to support a fall then just walking on the top plate itself. **Walking on the exterior walls is not allowed**.

- Do not remain at the ridge or truss peak any longer than necessary.

Roof Sheeting

Clean boots or shoes of mud before walking on sheeting. When the sheeting is wet, stop working. If wind speed makes handling sheeting unsafe, stop working.

- Install 2 foot rips of sheeting at the bottom of the trusses or rafters rather than a full 4 foot piece. Multiple rips can be cut on one pass of the saw while the sheeting is flat on the staged material. The workers can stand safely in webs or ceiling joists to fully attach this rip. Still standing safely, the workers can now install the 12 foot, 14 foot, or 16 foot double 2 x 4 slide guards or the metal brackets and single 2 x 4 guard. The next row of 4 foot wide plywood is installed while standing on the slide guards.

- Slide guards must be a continuous standing 2 x 4 (3½”). At roof slopes up to and including 9:12, after the bottom slide guard, a guard is required at no more than every 13 feet on up the roof. Roof slopes over 9:12 have slide guards every four foot on up the roof.

- Do not enter the CAZ if you are not involved in the sheeting. If any visitor or other tradesman not listed on the FPP comes into the CAZ, **all work must stop**.

- When working on concrete and concrete block foundation walls and similar formwork, securely brace all formwork before working on top of it.

Attics and Roofs

The roof must be inspected by the competent person for slip hazards. Your contractor must get rid of any slip hazards or have you work in another area of the roof until the hazards are gone.

- Do not store materials within 6 feet of the sides of a roof where there is a fall hazard. Do not go up or down the roof closer than 6 feet to the edge of the sides of a roof where there is a fall hazard. Stay away from the edge when moving up and down on the roof.

- Repair any damaged parts of the roof.

- While attic or roof work is in progress, other workers not working with you must not be under you at all. They could be struck by something accidentally dropped.

Special Requirements
Based on the Roof Slope and the Working Height

The bottom of the roof (the eave height) up to 25 feet-any type of roofing-up to 4 in 12 slope	**Use either a safety monitoring system or roofing slide guards**
Eave height up to 25 feet-any roofing, except tile or metal-between 4 in 12 and 8 in 12 slope	**Use roofing slide guards**
Eave height up to 25 feet-tile or metal roofing-up to 8 in 12 slope	**Safety monitoring systems can be used instead of slide guards. The slide guards would put holes in the tile or metal roofing.**
Eave height up to 25 feet-any roofing-over 8 in 12 slope **Gutter height over 25 feet-any roofing-any slope**	**Conventional fall protection is required. This would mean guardrails, safety net systems, or personal fall arrest systems (PFAS). Guardrails and safety net systems do not work well on residential roofs, leaving PFAS as the likely choice.**

Fall Protection Plans

A written fall protection plan (FPP) option is available for leading edge work, pre-cast erection work, or residential construction work when other forms of fall protection just will not work. The contractor must have considered all the other types of fall protection before using the written FPP option. For residential construction, leading edge work as listed in the *Interim Fall Protection Guidelines,* the FPP does not have to be in writing. We recommend a written program that follows these guidelines:

1. Be written for each jobsite by a qualified person. Kept up-to-date with **changes** made by the qualified person.
2. Keep the FPP at the jobsite and ensure it is used under the supervision of a **competent person**.
3. List why and the locations **conventional fall protection** (guardrails, personal fall-arrest systems, and safety nets) could not be used. These locations must also be covered by a Controlled Access Zone (CAZ).
4. List all other **ideas or methods** of work to reduce all worker falls.Describe the **safety monitoring** duties of the competent person.
5. List the **name and duty** of all the contractor's workers in the CAZ working under the FPP.
6. **All work stops** if any person not listed enters the CAZ.
7. If a fall happens, the qualified person needs to investigate the **accident** and change the FPP if necessary. The changes are used for all further work under the FPP.

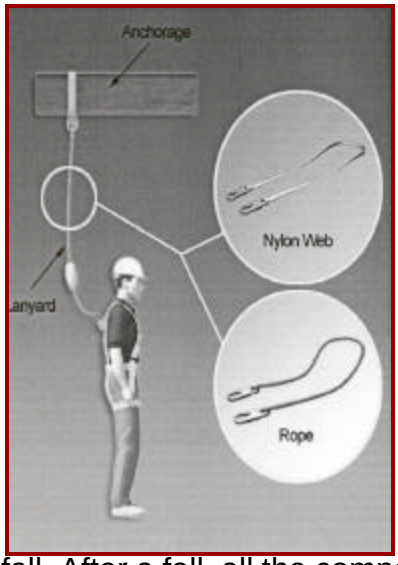
Job-Site Training

Training **before** an accident happens is an important part of fall protection. Your contractor must train you on **each jobsite**. Sometimes you are working on the same type of jobsites for several different contractors over several years and your initial training, will probably be enough for most residential jobs. Retraining on different jobsites or with other contractors will help you recognize more fall hazards and ways to protect yourself.

Personal Protective Equipment For Fall Protection

Personal Fall-Arrest Systems (PFAS)

Understand the basic ideas and terms about fall-arrest, before using a personal fall-arrest system (PFAS). It will be too late if you fall and have made a mistake about using it.



A PFAS is personal fall protection that you regularly wear when near a fall hazard because a guardrail, for example, would not work. PFAS really is made to work **when** a fall occurs. It does not prevent a fall, but arrests your fall so that you do not fall to the ground or lower levels. Other types of conventional fall protection prevent you from falling without having to wear any equipment.

A personal fall-arrest system (PFAS) consists of an anchor, lanyard, connectors, and a body harness that work together to stop a fall and to minimize the arrest force. Other system components may include a deceleration device and a lifeline. However, the personal fall-arrest system is effective only if you know how all of the parts work together to arrest a fall. After a fall, all the components must be removed from use and carefully inspected and replaced when necessary.

When a fall occurs, if you cannot rescue yourself, then your life depends upon the quick actions of your coworkers. Check out the rescue plans for your job site, before the job starts.

PFAS and parts that have stopped a fall must be immediately removed from use and not used until inspected and found to be undamaged and safe for use again by a competent person.

The Anchor

The anchor, one of the most important PFAS parts, must support at least **5,000 pounds**. Finding an anchor on a wood-frame residential building that will meet that requirement is not easy.

A mid-size four-wheel-drive pickup weighs about 5,000 pounds. Think about hanging this pickup on an anchor that you might use with a PFAS. Would you trust that anchor to hold you?

If you have questions, contact your competent person. A **competent person** can recognize existing and possible hazards on the job. A competent person is one who has the authority to take quick steps to remove any PFAS hazards. Your contractor decides who is the competent person on your job also.

Never use guardrails, crane hooks, or scaffolds as anchors. They are not built to withstand the impact forces generated by a fall, everything may come down if you fall.

D-Rings and Locking Snap Hooks (Connectors)

Connectors couple the parts of a PFAS together. D-rings and **locking-type snap hooks** are the most common types of connectors. A lanyard or a deceleration device attaches to the **single back D-ring** on the body-harness. The locking snap hook consists of a hook-shaped member and a keeper. D-rings and locking snap hooks must be able to support **5,000 pounds**.

There are two types of snap hooks, locking and non-locking. The locking type has a self-locking keeper that won't open until it's unlocked. OSHA has determined the non-locking type is not safe and will not allow them to be used on any worksite. **Use only locking-type snap hooks as part of a PFAS.**

No one can attach their lanyard to your body harness D-ring. Locking snap hooks cannot be attached to any body harness webbing or onto the lanyard itself, only onto a D-ring. D-rings come in various sizes. Do not attach too many connectors to a small D-ring. Check with the competent person for enough room in the D-ring for two connectors, from two lanyards, to move around safely.

The Body Harness

The body harness, also known as a full-body harness, is made of straps that distribute fall-arrest forces over your thighs, waist, chest, shoulders, and pelvis. Body harnesses come in many styles, most of which are light and comfortable.

A basic harness should include a **single back D-ring** for a attaching the locking snap hook on a lifeline, a lanyard, or a retractable device. A body harness must not transfer more than **1,800 pounds** of stopping force to a falling worker. Use only body harnesses approved for **construction** work. Do not use recreational **rock climbing** harnesses.

Body Harness

- Sizes ranging from small to extra large
- Friction buckles, mating buckles, tongue buckles and combination of these
- Tool belt loops
- Two side positioning D-rings on the waist belt
- Positioning front chest D-ring for positioning work only!
- Specifically designed for women
- Integral body harness sewn into full coveralls and work vest (including leg straps)
- Welding harnesses with Nomex webbing to protect against weld splatter and a Kevlar core for added strength and high temperature resistance.
- Made of high-visibility reflective webbing

Lanyards

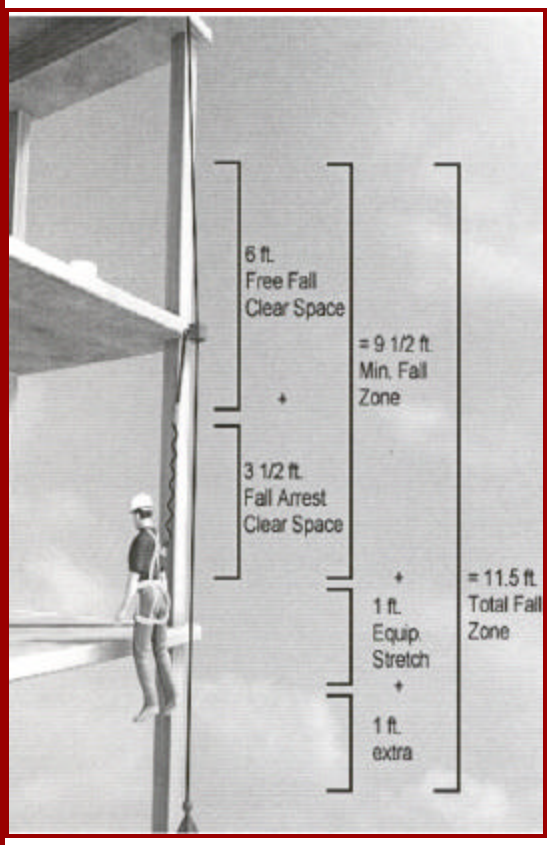
A lanyard is a specially designed **synthetic rope or webbing** that connects a body harness to an anchor, a deceleration device, or a lifeline. **The use of steel lanyards for fall protection without a shock-absorbing device is not recommended.** Lanyards must support at least **5,000 pounds**.

There are a variety of designs including **self-retracting** types that make moving easier and **shock-absorbing deceleration devices** that automatically reduce fall-arrest forces.

Having two lanyards connected to the single back D-ring on your body harness allows you to stay safely connected with one lanyard while moving and attaching your next lanyard. One lanyard can always stay safely attached. With only a single lanyard, when moving from one anchor to another, you have **no** fall protection. Some body harnesses have one lanyard permanently attached, one manufacturer has two permanently attached.

Lanyards are sometimes adjustable from 2' to 6' (the maximum), to reduce the fall distance. Remember the following when you use a lanyard:

- Do not attach to guardrails
- Do not attach to any hoists or vehicles, assume that they might move.
- Protect the lanyard so that it is not cut or abraded.
- **Do not use rope lanyards made from natural fibers**. Self-retracting lanyards are: shaped like large chalk boxes; attaches to a regular anchor; holds 11 feet to 50 feet of synthetic webbing or steel cable that moves into and out of the case as you move back and forth; and has a locking snap ring on the webbing or cable end.



If the **free-fall distance is limited to two feet or less** all the parts must support at least 3,000 pounds with the lanyard fully extended.

If the **free-fall distance is more than two feet, but not more than the standard 6 feet**, all the parts must support at least 5,000 pounds with the lanyard fully extended. With this type of lanyard you must work directly below the anchor, or as close as possible to directly below the anchor, to avoid **swing falls**.

A swing fall with a self-retracting PFAS is the **swinging motion** when you work too far to the right or left of the anchor, then fall, and swing back (maybe **back and forth** a couple times) to hang directly under the anchor point. Swing falls only happen with a self-retracting lifeline where the free-fall distance is more than two feet, but not more than the standard 6 feet free-fall distance.

PFAS and parts that have stopped a fall must be immediately removed from use and not used until inspected and found to be undamaged and safe for use again by a competent person.

Shock-Absorbing Devices

A lanyard with a shock-absorbing deceleration device built-in, or added as a separate piece using another set of locking snap hooks, is called a shock-absorbing lanyard. Fall impact forces on your body are **reduced** as this device slows down the fall just before the stopping point. **Always use a shock absorber for fall protection.**

The shock-absorbing device is a **3.5 foot maximum** length of webbing folded over several times and then sewn together. During a fall, the stitches come apart and slows down the fall automatically reducing the forces and removing any bounce at full extension. There are actually several types of shock-absorbing devices, but all are limited to the 3.5 foot extension length.

The 3.5 foot shock-absorbing maximum distance must be added to the 6 foot free-fall maximum distance for a maximum **total fall distance** of 9.5 feet. There are shock-absorbing lanyards that have only 1 foot or 3 foot of normal lanyard material (not shock-absorbing) to reduce the total fall distance.

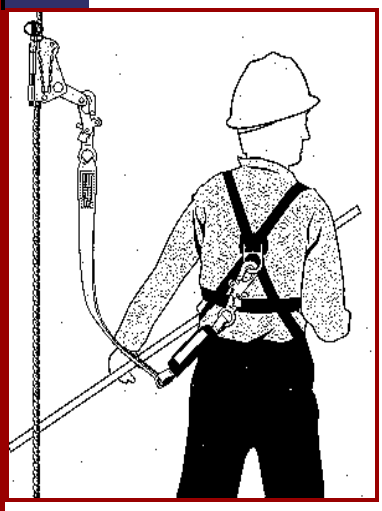
To the total fall distance of 9.5 feet you need to add another 2 feet, or **11.5 feet clearance**. 1 foot will be for the **stretch** in the equipment and another 1 foot as a **safety** margin.

Vertical Lifelines

A lifeline supports at least 5,000 pounds and is used to connect a body harness, lanyard, or deceleration device to one or two anchors.

A vertical lifeline, also known as a **rope grab**, is a synthetic rope that hangs vertically from one anchor. A sliding metal part moves easily up and down the rope when you move it by hand, but automatically holds you if you fall. The sliding metal part has small teeth that grip the synthetic rope. You must **check the rope** every time you use it to see that the rope is not too worn from these teeth.

The sliding metal part may have either a D-ring or lanyard directly connected to it for attaching to your full-body harness. The lanyard must be 6 feet or less but can also have a 3.5 foot shock-absorber. Vertical lifelines must support at least 5,000 pounds.



Only one worker can be attached to one vertical lifeline. If there are two workers, there needs to be two vertical lifelines attached to two separate anchors. The vertical lifeline must be setup and installed under the supervision of the qualified person.

If you need to move horizontally over an extended distance, a vertical lifeline can be hazardous because it creates the potential for a **swing fall**.

"Tying Off"

"Tying off' is correctly hooking to an anchor. It is an important part of using a PFAS. Remember the following points - they're very important to tying off safely:

- Plan the anchor points carefully. Think about the anchor locations before construction work begins. It's possible to design anchors into a building for window cleaning or other maintenance tasks, for example. Workers can use properly planned anchors during the construction phase, as well. A qualified person must design anchor systems installed during construction.

- Avoid knots in rope lanyards and lifelines. Knots can reduce the strength of a lifeline or a lanyard by 50 percent or more. Also avoid using knots for tying off to an anchor; use a locking snaphook designed for that purpose.

Swing Falls

If you use a PFAS and are not working directly below the tie-off anchor, you will swing back under the anchor during a fall. Swing falls are especially hazardous because you can hit an object or a lower level during the swinging. Think about swing falls whenever you connect a lifeline to a PFAS.

Remember the following about swing falls:

- Fall distance can actually **increase** during a swing fall.

- You can hit just as hard from a swing fall as from a vertical fall of the same distance.

- During a swing fall, you can strike an object or lower level before a self-retracting lifeline - with a free-fall distance more than two feet - stops your fall.

Positioning Device

A positioning device allows you to be attached to, or sometimes even around the work, such as a tall wall or concrete form, and work safely off the ground with both hands free. This is similar to how a phone or cable installer works high on a telephone pole. A positioning device consists of an **adjustable lanyard** sometimes 15 or 20 feet long that will connect between an anchor and your full-body harness allowing movement **up to, but not over** an edge. The lanyard is never meant to stop your fall – it just prevents you from getting near the edge of the work. It is adjusted for this distance and forgotten while you are working. Positioning devices could be used for example to install guardrails or windows and doors above the first floor.

Inspecting, Cleaning and Storing Personal Fall-Arrest Systems

Equipment care is vital to the success of the personal fall arrest systems. Take care of your equipment to ensure your safety.

To maintain their life, all harnesses, lanyards, and connectors should be inspected often. Make a visual inspection of your equipment **before each use**. The competent person should also check your equipment on a regular schedule, following the manufacturer's recommendations. Look for broken stitches, discoloration, cuts, abrasions, broken threads, weld marks, burns, heat exposure and broken or bent hardware. If any defects are noticed, replace the equipment. Additionally, if any part of a personal fall arrest system fails or is shock loaded, it must be removed from service and cannot be reused.

Basic care for fall protection safety equipment will prolong and ensure the life of the equipment and contribute toward the performance of its vital safety function. Proper storage and maintenance after use is as important as cleaning the equipment of dirt, corrosives or contaminants. The storage area should be clean, dry and free of exposure to fumes or corrosive elements. Because the equipment is primarily made of synthetic material, it should not be stored in or near sunlight because ultraviolet radiation deteriorates synthetics and may cause permanent damage to the equipment. Do not store in the back of your truck because both the heat and sunlight would damage it.


Proper Equipment Storage


Improper Equipment Storage

Inspection

Harness Inspection

Belts and Rings: For harness inspections begin at one end, hold the body side of the belt toward you, grasping the belt with your hands six to eight inches apart. Bend the belt in an inverted "U." Watch for frayed edges, broken fibers, pulled stitches, cuts or chemical damage.

Give special attention to attachments of buckles and D-rings. Note any unusual wear, frayed or cut fibers, or distortion of the buckles. Rivets should be tight. Body side rivet base and outside rivets should be flat against the material. Bent rivets will fail under stress.

Inspect frayed or broken strands. Broken webbing strands generally appear as tufts on the webbing surface. Any broken, cut or burnt stitches will be readily seen.

Buckles and Rings	
D-rings and D-ring metal wear pads	Check for distortion, cracks, breaks, and rough or sharp edges. The D-ring bar should be at a 90-degree angle with the long axis of the belt and should pivot freely.
Tongue Buckle	Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Rollers should turn freely on the frame. Check for distortion or sharp edges.
Friction Buckle	Inspect the buckle for distortion. The outer bar or center bars must be straight. Pay special attention to corners and attachment points of the center bar.

Lanyard Inspection

When inspecting lanyards, begin at one end and work to the opposite end. Slowly rotate the lanyard so that the entire circumference is checked. Spliced ends require particular attention. Hardware should be examined under procedures detailed below.

Hardware & Lanyard	
Snaps	Inspect closely for hook and eye distortion, cracks, corrosion, or pitted surfaces. The keeper or latch should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper. Keeper locks must provide the keeper from opening when the keeper closes.
Thimbles	The thimble (protective plastic sleeve) must be firmly seated in the eye of the splice, and the splice should have no loose or cut strands. The edges of the thimble should be free of sharp edges, distortion, or cracks.
Steel Lanyards	While rotating a steel lanyard, watch for cuts, frayed areas, or unusual wear patterns on the wire. The use of steel lanyards for fall protection without a shock-absorbing device is not recommended.
Web Lanyard	While bending webbing over a piece of pipe, observe each side of the webbed lanyard. This will reveal any cuts or breaks. Due to the limited elasticity of the web lanyard, fall protection without the use of a shock absorber is not recommended.
Rope Lanyard	Rotation of the rope lanyard while inspecting from end to end will bring to light any fuzzy, worn, broken or cut fibers. Weakened areas from extreme loads will appear as a noticeable change in original diameter. The rope diameter should be uniform throughout, following a short break-in period. When a rope lanyard is used for fall protection, a shock-absorbing system should be included.

Shock-Absorbing Packs

The outer portion of the shock-absorbing pack should be examined for burn holes and tears. Stitching on areas where the pack is sewn to the D-ring, belt or lanyard should be examined for loose strands, rips and deterioration.

Visual Indication of Damage to Webbing and Rope Lanyards

Heat
In excessive heat, nylon becomes brittle and has a shriveled brownish appearance. Fibers will break when flexed and should not be used above 180 degrees Fahrenheit.

Chemical
Change in color usually appears as a brownish smear or smudge. Transverse cracks appear when belt is bent over tight. This causes a loss of elasticity in the belt.

Molten Metal or Flame
Webbing and rope strands may be fused together by molten metal or flame. Watch for hard, shiny spots or a hard and brittle feel. Webbing will not support combustion, nylon will.

Paint and Solvents
Paint will penetrate and dry, restricting movements of fibers. Drying agents and solvents in some paints will appear as chemical damage.

Cleaning Equipment

Basic care for fall protection safety equipment will prolong and endure the life of the equipment and contribute toward the performance of its vital safety function. Proper storage and maintenance after use is as important as cleaning the equipment of dirt, corrosives or contaminants. The storage area should be clean, dry and free of exposure to fumes or corrosive elements.

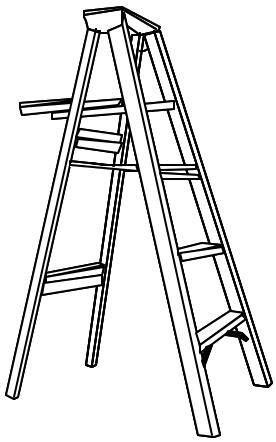
For nylon and polyester, wipe off all surface dirt with a sponge dampened in plain water. Squeeze the sponge dry.

Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a vigorous back and forth motion. Then wipe the belt dry with a clean cloth. Hang freely to dry, but away from excessive heat.

Dry harnesses, belts and other equipment thoroughly without exposure to heat, steam or long periods of sunlight.

Working Safely from Ladders

Ladders of all types are used in residential construction work. Falls from ladders account for many fall-from-elevation injuries. You don't have to fall far to get hurt. Workers injured in falls from ladders are usually less than 10 feet above the ladder's base of support. Most injuries associated with falls result from slips, loss of footing, or unstable ladders.



- Wood ladders cannot be painted except for contractor names or warning labels, and then placed only on one face of a side rail.

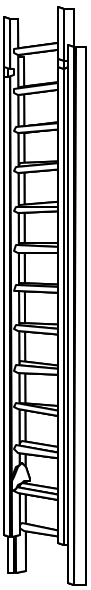
- Ladders must have surfaces that will not cut workers or snag their clothing.

- Ladders must be able to support at least four times their maximum intended load, the worker with tools and materials.

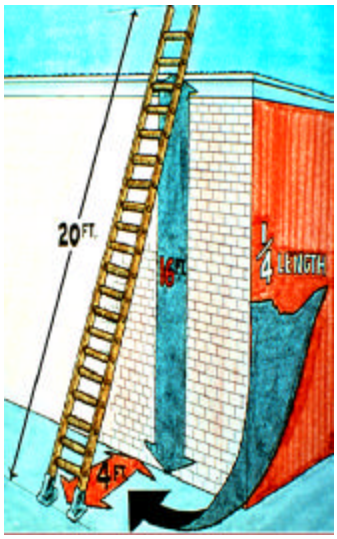
- Ladder rungs must be parallel, level and equally spaced between 8 and 12 inches apart and be made to limit slipping.

- A metal spreader must hold the front and back sections of a stepladder in an open position when being used.

- When the climbing height requires two or more ladder lengths to be used, there must be a landing between each ladder and the ladders cannot directly line up. Use conventional fall protection at the landings.



Safe practice guidelines for ladder work



- Select a ladder that's correct for the job. The ladder top must extend at least 36 inches above the access area it serves.
- Inspect the ladder before using it; it should be dry, clean, and undamaged.
- Angle the ladder properly; position the base so that the distance to the building is at least one-fourth the ladder's length. The minimum slope should be 50 degrees.
- Protect the base of the ladder so that people or vehicles won't strike it. Face the ladder and keep both hands on the side rails.
- Raise and lower heavy loads with a hand line or hoist.
- Make sure metal ladders have steps and rungs with skid-resistant surfaces.
- Allow only one person to work from a ladder.
- Use a scaffold when two or more people must work together.
- Keep off the top steps of portable ladders.
- Keep ladders with conductive side rails away from exposed, energized equipment.

Manufactured ladders have warning markings and labels, such as "CAUTION" and "DANGER", which are usually in red or yellow. They often have "safety" labels, which give information on how to use the ladder safely.

Before you use a ladder, check it's rating to see if you have the right ladder for the job. Be sure not to subject the ladder to a workload greater than its rated capacity. Always read manufacturer's labels and follow their recommendations.

Workbook Definitions

Anchor
A secure point of attachment for workers' lifelines, lanyards, or deceleration devices. Anchors must be capable of supporting a minimum load of 5,000 pounds per worker (or designed, installed, and used under the supervision of a qualified person as part of a complete personal fall-arrest system which maintains a safety factor of at least two).

Body harness
Straps that an individual wears to distribute fall-arresting forces over the thighs, waist, chest, shoulders, and pelvis. Attaches to other components of a personal fall-arrest system. The maximum safe arresting force for a body harness is 1,800 pounds.

Competent person
A person who is capable of identifying existing and predictable hazards in the work environment and who has authorization to take prompt actions to eliminate the hazards.

Connector
A device used to couple (connect) components of a personal fall-arrest system. The connector may be an independent component (such as a carabineer) or an integral component (such as a buckle or D-ring) to the system. Connectors must be drop-forged or made of equivalent materials; they must have a corrosion-resistant finish and all surfaces and edges must be smooth to prevent damage to other parts of the system.

Controlled Access Zone (CAZ)
An area designated for overhand bricklaying operations or leading edge construction. Conventional fall-protection systems, guardrail systems, personal fall-arrest systems or safety net systems are not required in a CAZ; access is restricted to all workers except those performing the work.

Conventional fall protection
A guardrail system, safety net system, or personal fall-arrest system (PFAS), positioning device systems, and covers.

Cover
A rigid object used to overlay openings in floors, roofs, and other walking and working surfaces.

Deceleration device
Any mechanism that dissipates or limits energy imposed on a person during fall arrest. Examples include rope grabs, rip stitch lanyards, special woven lanyards, and automatic self-retracting lifelines.

Deceleration distance
The additional vertical distance a worker falls before stopping - excluding lifeline elongation and free-fall distance - from the point at which a deceleration device begins to operate. The distance is measured from the worker's body harness attachment point just before the device activates to the attachment point after the worker comes to a full stop.

D-rings
Attachment points on a body harness for deceleration devices or lanyards. D-rings must be capable of sustaining a minimum tensile load of 5,000 pounds.

Equivalent
Refers to an alternative design, material, or method that an employer can demonstrate will provide an equal or greater degree of safety for workers than the method or item specified in a standard.

Fall Protection Plan (FPP)
Enables workers doing leading-edge work, pre-cast concrete erection work, or residential-type construction work to use alternative fall-protection systems or methods when conventional systems aren't feasible. To implement a fall-protection plan, employers must be able to show that conventional fall-protection systems are not practical or add to worker risk.

Fall restraint system
A fall-protection system designed to physically prevent a worker from free falling. Components include a body harness, a rope or web lanyard, connectors, and an anchor. Fall-restraint systems are not covered in OSHA's Subdivision M requirements for fall protection in the construction industry.

Free fall
Falling before fall protection begins to arrest the fall.

Free-fall distance
The vertical distance a worker falls before a personal fall-arrest system stops the fall; measured from the attachment point of the personal fall-arrest system immediately before and after the fall, excluding deceleration distance and lanyard and lifeline elongation, but including deceleration device slide distance or self-retracting lifeline/lanyard extension before fall-arrest forces occur.

Guardrail system
Vertical barriers erected to prevent workers from falling to a lower level.

Hole
Any opening more than two inches wide in a floor, roof, or other walking and working surface.

Horizontal lifeline
A flexible horizontal cable or wire rope line anchored at both ends to which a worker's body harness or lanyard attaches. Horizontal lifelines must be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall-arrest system.

Lanyard
A flexible rope, strap, or webbing that connects a body harness to a deceleration device, lifeline, or anchor. Lanyards that tie off one worker must have a minimum breaking strength of 5,000 pounds. Lanyards that automatically limit free-fall distance to two feet or less must have components capable of sustaining a minimum static tensile load of 3,000 pounds with the lanyard in the fully extended position.

Leading edge
The edge of a floor, roof, formwork, or other walking and working surface that changes location as additional sections are placed. Leading edges not actively under construction are considered unprotected sides and edges.

Lifeline
A flexible line that attaches directly to a person's body harness, lanyard, or deceleration device at one end and to an anchor at the other end. A lifeline that hangs vertically and is connected to one anchor is a vertical lifeline. A lifeline that stretches horizontally between two anchors is a horizontal lifeline. All lifelines must be protected against cuts or abrasions. They cannot be made of natural fiber rope.

Lower level
Surface to which a worker can fall. Examples: ground levels, floors, ramps, runways, excavations, pits, tanks, material, water, and equipment.

Midrail
A rail approximately midway between the guardrail and platform, secured to the uprights erected along the exposed sides and ends of platforms.

Opening
Any space more than 30 inches high and 18 inches wide in a wall or partition, through which workers could fall to a lower level.

Personal fall-arrest system
A conventional fall protection system designed to stop a single worker from free falling to a lower level. Components include an anchor, connectors, a body harness, and may include a lanyard, deceleration device, or lifeline.

Platform
A temporary elevated working surface such as the floor of a scaffold.

Qualified person
A person who by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to resolve problems relating to a specific subject, operation, or project.

Residential-type construction
Construction work on all types of structures, including commercial buildings that are wood or light-steel framed and covered with materials commonly associated with residential structures. Residential-type construction does not include tilt-up buildings, butler-type buildings, or large commercial structures.

Rope grab
A deceleration device that moves along a vertical lifeline; it automatically engages and locks on the lifeline when a worker falls.

Roof
The exterior surface on the top of a building. Does not include floors or formwork, which, if a building is not completed, temporarily become the top surface.

Roofing work
Includes hoisting, storing, applying, and removing roofing materials and equipment.

Safety factor
The weight ratio of a breaking load to safe load. For example, the anchor for a personal fall-arrest system must be able to hold at least 5,000 pounds or it must be installed under the supervision of the qualified person and it must maintain a safety factor of at least two times the impact force of a worker free falling six feet.

Safety monitoring system
A fall-protection system that requires a monitor (competent person) to be responsible for recognizing fall hazards and warning workers when they are at risk of falling.

Safety net system
A fall-arrest system of mesh nets, including panels, connectors, and other impact-absorbing components.

Sag angle
A horizontal lifeline's angle of deflection when the line is subjected to a load.

Scaffold
Any temporary elevated platform and its supporting structure used for supporting workers, materials, or both.

Self-retracting lifeline/lanyard
A deceleration device consisting of a drum-wound line that retracts or extends from the drum with normal worker movements; in the event of a fall, the drum automatically locks. Self-retracting lifelines that automatically limit free-fall distance to two feet or less must have components capable of sustaining a minimum static tensile load of 3,000 pounds. Self-retracting lifelines that do not limit free-fall distance to two feet or less must be capable of sustaining a minimum tensile load of 5,000 pounds. The free-fall distance cannot be more than the standard maximum of 6 feet.

Slide guards
Used in residential construction to prevent workers from sliding off a sloped roof.

Snap hook-locking type
A connector, consisting of a hook-shaped member with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection. Non-locking snaphooks (a self-closing keeper without the keeper lock) can never be used for fall protection or positioning work, the keeper may open accidentally allowing you to fall.

Suspended scaffold
A scaffold supported on wire or other ropes, used for work on, or for providing access to, vertical sides of structures on a temporary basis.

Swing fall
The pendulum motion that results when a worker using a personal fall-arrest system falls and swings back under the system's anchor point.

Tie off
The act of connecting to an anchor; tied-off means being connected to an anchor.

Tie-off adaptor/beam connector
Devices that anchor vertical lifelines or lanyards to I-beams and other objects with rough edges.

Toeboard
A low protective barrier that prevents materials and equipment from falling to lower levels.

Vertical lifeline
A flexible vertical cable or synthetic rope line anchored at one end; the other end attaches to a worker's body harness, lanyard, or deceleration device. Each worker must be attached to a separate vertical lifeline. Vertical lifelines must have a minimum breaking strength of 5,000 pounds.

Warning/barrier lines and barricades
A warning line or barrier erected on a flat elevated surface 6 feet in from the edge, to designate a safe work area. Workers are not allowed outside the designated safe work area without adequate fall protection. Warning/barrier lines warn you of a fall, rather than stop your fall and do not need to be as strong as guardrails, which stop your fall.

Warning line system
A barrier erected on a roof, 6 feet in from the edge, to warn workers they are approaching an unprotected edge; designates an area for roofing work without conventional fall-protection systems (guardrail, safety net, or personal fall-arrest).

Work area
The portion of a walking/working surface where workers perform job tasks.